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ERRORS IN THE USE OF THE PRESENT ESTIMATING FACTOR IN PINE BEETLE SURVEYS

by

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Since it is impossible to spot all current insect-killed trees at the time the fall cruise is usually made, the common practice has been to use an estimating or correction factor to arrive at the predicted loss on each plot. Keen, Johnson, and Grant have each prepared curves for this purpose. The general procedure is to adjust each plot total by a percentage figure read from these charts, the magnitude of the adjustment depending on the date the plot was actually cruised.

The purpose of this report is to point out certain errors in the system. The fallacy with all these corrections is the assumption that time is the most important element in the percentage of trees which are spotted during any period of the year. Other things being equal, this is certainly true, but the trouble is that other things are not always equal. It is the definite conviction of the writer that there are other elements controlling the results which are much more important than time. A number of factors which are likely to upset this applecart of time include the type of weather when the plot was cruised, the general disposition of the crew at the time of the cruise, and, of course, the experience and dependability of the crew. Another very important source of error lies in the spotter's interpretation of a current bug tree versus one which was killed the previous season. Unless such trees are correctly marked, it introduces an error in the results of both the current year and in the previous year.

The data from the 20 Ochoco plots for the 1941 loss has been analyzed to compare the expected result, as read from the estimating curve, with the actual loss from both cruises. These data appear to show that a much higher percentage of loss was cruised in 1941 than was expected, Table I. The average expected loss as read from Grant's estimating curve would be 74.4 percent. The average percent actually cruised was much greater, being 87.9 percent. It may be noted from Table I and Figure 1 that there is no consistency of percent cruised with time except appearing to show that there is a lower percent picked up as the season advances. It is possible to draw a balanced curve through these data to show that in the plots cruised early, a much higher percent of the loss was picked up than those cruised at a much later date. For the purposes of comparison, these 20 plots were segregated into 4 groups of 5 plots each. In the first 5 plots cruised between September 29 and October 3, 1941,

93.9 percent of the loss was picked up; in the next groups cruised between October 15 and 21, 88.2 percent was picked up; in the third group cruised between October 22 and 27, 85.6 percent was picked up; and in the fourth group cruised between October 29 and November 2, only 81.2 percent was picked up.

In Table II a comparison is made between the volume loss per acre expected as read from the curve and that actually cruised. It may be noted from this Table that there appears to be no consistency between the expected and actual. In 15 cases out of 20, the expected was much greater than the actual with the maximum discrepancy being 54 percent. In two cases there was agreement of expected with actual and in 3 cases the expected was less than the actual. The range in discrepancy was from 54 percent plus to 19 percent minus with 20 percent plus as the average. This means that the 1941 loss would have been over-estimated 20 percent using Grant's estimating curve.

Two additional examples from the survey results in California in 1937 offer further evidence that the expected loss bears no relationship with that actually cruised. Figure II is taken from data collected on the Modoc National Forest and Figure III from Lassen data. Both these figures appear to show no correlation of expected with actual results. These three examples appear to show a need for a reappraisal of the validity of the use of an estimating factor based upon the element of time alone.

Literature Cited

Grant, R. C. 1941 — The Construction of a Curve For Predicting Total Annual Loss From Partial Loss Data in Western Pine Beetle Surveys - Report, Forest Insect Laboratory, Portland, Oregon.

Johnson, P. C. 1935 — Correction Factors For Use in Estimating Total Seasonal Bark Beetle Losses in California - Report, Forest Insect Laboratory, Berkeley, California.

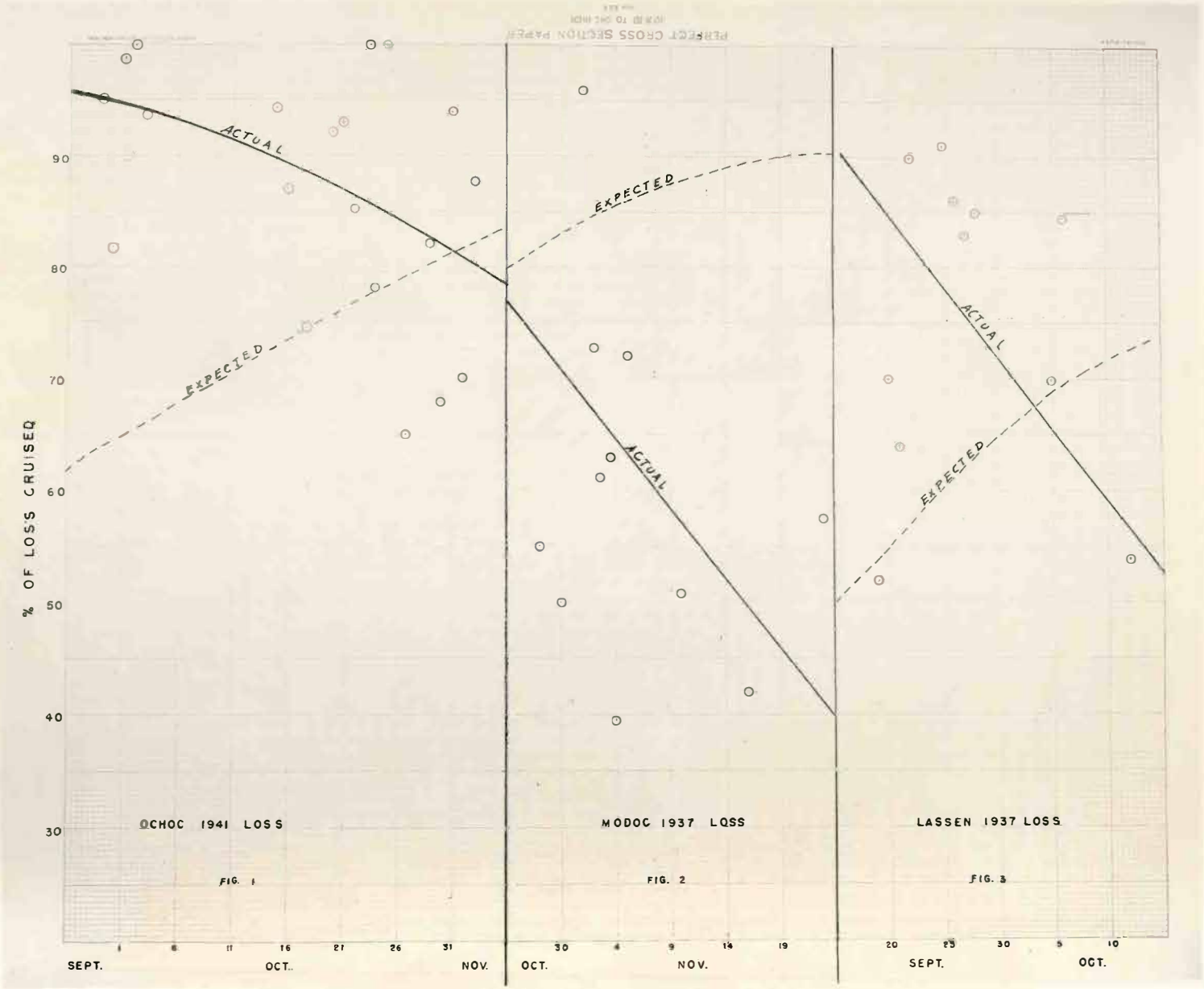
Keen, F. P. 1931 — Estimating Pine Beetle Losses During Period of Attack - Report, Forest Insect Laboratory, Portland, Oregon.

TABLE I - Summary of Results of 1941 Loss on the Ochoco National Forest - Comparing Actual Cruise with Expected.

Plot	Date Cruised	Volume of 1941 Loss Cruised - B. M. In 1941	In 1942	Total	% Actually Cruised 1941	% Expected
Hamilton	9/29/41	18,090	910	19,000	95.2	63
Horse Heaven	9/30/41	9,370	2,130	11,500	81.5	64
Wildcat	10/1/41	16,980	190	17,170	98.9	65
Stevenson	10/2/41	7,690	0	7,690	100.0	65
Dry Creek	10/3/41	26,680	1,870	28,550	93.5	66
Double Cabin	10/15/41	23,010	1,370	24,380	94.4	73
Horse Prairie	10/16/41	18,650	2,780	21,430	87.0	73
Black Mt.	10/17/41	3,370	1,170	4,540	74.2	74
Waterman	10/20/41	21,410	1,800	23,210	92.2	75
Spanish Peak	10/21/41	21,420	1,620	23,040	93.0	76
760-Spring	10/22/41	9,880	1,720	11,600	85.2	77
Paulina	10/23/41	11,210	0	11,210	100.0	77
Sunflower	10/24/41	9,780	2,760	12,540	78.0	78
Thorne Mill	10/25/41	4,280	0	4,280	100.0	78
Bixby	10/27/41	9,690	5,250	14,940	64.8	79
Nicoli	10/29/41	32,770	4,870	37,640	87.1	80
Soda Spring	10/30/41	11,640	5,560	17,200	67.7	81
Bear Butte	10/31/41	14,420	910	15,330	94.1	81
Emigrant	11/1/41	7,620	3,280	10,900	69.9	82
Green Butte	11/2/41	14,210	2,020	16,230	87.6	82
Total		292,170	40,210	332,380	87.9	74.4

TABLE II - Comparison of Expected Percent of Total 1941 Loss Cruised with that Actually Cruised - Ochoco National Forest.

Plot	Loss Per Acre - Volume-B. M. Expected, from Curve	Actual from Cruise	Percent Difference Plus	Minus	Date of Original Cruise
Hamilton	90	59	53		9/29/41
Horse Heaven	46	36	28		9/30/41
Wildcat	82	54	52		10/1/41
Stevenson	37	24	54		10/2/41
Dry Creek	126	89	42		10/3/41
Double Cabin	99	76	30		10/15/41
Horse Prairie	80	67	19		10/16/41
Black Mt.	14	14	0	0	10/17/41
Waterman	89	72	24		10/20/41
Spanish Peak	88	72	22		10/21/41
760-Spring	40	36	11		10/22/41
Paulina	46	35	31		10/23/41
Sunflower	39	39	0	0	10/24/41
Thorne Mill	17	13	31		10/25/41
Bixby	38	47		19	10/27/41
Nicoli	128	118	8		10/29/41
Soda Spring	45	54		17	10/30/41
Bear Butte	56	48	17		10/31/41
Emigrant	29	34		15	11/1/41
Green Butte	54	51	6		11/2/41
Average	62	52	20		


% OF LOSS CRUISED
90
80
70
60
50
40
30
ACTUAL
EXPECTED
EXPECTED
ACTUAL
ACTUAL
EXPECTED
OCHOC 1941 LOSS
FIG. 1
MODOC 1937 LOSS
FIG. 2
LASSEN 1937 LOSS
FIG. 3
SEPT.
OCT.
NOV.
OCT.
NOV.
SEPT.
OCT.